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The effect of gender on pain, hip muscle strength, fatigue and functionality in adults patients with Guillain-Barre syndrome

Gender in Guillain Barre

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Abstract

Aim: Patients with Guillain-Barre Syndrome (GBS) commonly suffer motor, sensorial and functional problems. Gender may be the determining factor in the symptoms of these patients. The present study was planned to investigate the effect of gender on the severity of pain, muscle strength, fatigue, and loss of function in patients with GBS.

Material and Methods: Thirty-two adult patients with GBS (11 females, 21 male) were included in the study. Data on pain level, muscle strength, fatigue level, and functionality, which were assessed by using the Visual Analogue Scale (VAS), manual muscle testing, Fatigue Severity Scale and Functional Independence Measures, respectively, were obtained from patient files retrospectively.

Results: The mean age of the women was 55.90 ± 11.97 years, the mean age of the men was 63.14 ± 12.98 years. Bilateral hip extension strength of the women was significantly lower, while fatigue was significantly higher in men ($p<0.05$). No significant differences were detected in terms of other muscle strengths, pain level and functionality between the groups ($p>0.05$).

Discussion: It seems that women tend to have greater muscle weakness, while men show higher levels of fatigue in GBS. According to our results, more emphasis should be given to the strengthening of hip muscles in female patients with GBS, while energy conservation techniques should be prioritized in male patients with GBS during treatment.

Keywords

Guillain Barre Syndrome, Pain, Muscle Strength, Fatigue, Functional

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Introduction

Guillain-Barre syndrome (GBS) is caused by autoimmune activation, which the myelin sheath and/or axonal membrane of peripheric nerves [1]. GBS is an acute inflammatory polyneuropathy, which is associated with motor, sensory and autonomic affection. According to physical examination and electrodiagnostic findings, GBS is divided into different categories as acute inflammatory demyelinating polyneuropathy (AIDP), the most common form of GBS, acute motor and sensory axonal neuropathy (AMSAN), acute motor axonal neuropathy (AMAN), and Miller-Fisher Syndrome [2,3]. GBS causes a group of neuropathic findings characterised by especially motor problems including progressive weakness, loss of deep tendon reflexes over time [4]. Motor conduction velocity, distal motor latency, F-response latency decrease in GBS. The severity of symptoms reaches a plateau in less than 4 weeks [5,6].

Initial symptoms, including pain, numbness, sensory impairment, or muscle weakness in extremities, may be located proximally and/or distally. Following the plateau phase, recovery begins in proximal parts of limbs and proceeds to distal parts [5]. It was reported that mild to moderate muscle weakness and functional disability were present in 80% and 66.7% of all patients, respectively [7]. However, sensoria disturbances occur less commonly (26.7%) [7]. Muscle performance is a primary measurement to evaluate the effect of treatment after GBS. On the other hand, sensorial symptoms of GBS, especially, pain have recently become a subject of interest [8]. However, as they are subjectively reported, the underlying mechanisms are not fully understood for pain and fatigue [9].

Previously, age, diarrhea history, onset of the acute phase symptoms, muscle weakness at hospitalization helps in the analysis of prognostic predictors [4], however, to our knowledge, there are few studies exist, which reported the effect of gender on GBS symptoms. Some studies showed that male and younger populations are more likely to have GBS and both mortality and morbidity rate in patients with GBS approximately 2 times higher in males than females [4,10,11]. However, Yao et al. reported that gender was not significantly associated with disease severity in patients with GBS [8].

It seems that the literature on the effect of gender on GBS-related symptoms is controversial. Therefore, the present study was designed to investigate the effects of gender on pain level, muscle strength, fatigue level and functionality in patients with GBS.

Material and Methods

Participants

In this retrospective study, 32 patients (11 females, 21 males) who were hospitalized in the neurology service between October 2020 and March 2021 who were diagnosed with GBS were included. Patients who had acute pain, those who had other neurological diseases, who had physical dysfunction due to other problems, and had severe cognitive impairments were excluded. Patients were divided into two groups according to gender as female (Group 1) and male (Group 2). Ethical approval was obtained from the Ethics and Human Research committee of Pamukkale University Hospital (Denizli, Turkey) (60116787-020/66558).

Measurements

The data regarding demographics (age, gender, height, body weight, and medical history), pain (Visual Analog Scale (VAS)), muscle strength (Medical Research Council Muscle Strength Scale), fatigue (Fatigue Severity Scale (FSS)), and functionality (Functional Independence Measure (FIM)) were obtained from patient files, retrospectively.

The VAS is a self-assessment scale to measure pain intensity. The patient is asked to mark a point on a 10-cm line between 0 (no pain) and 10 (worst pain). The distance from the mark "0" indicates the pain level. The VAS was reported to be an easy and usable assessment for patients with GBS [10].

The Medical Research Council Muscle Strength Scale classifies the limb muscle strength from 0 (no muscle function) to 5 (normal strength) [8,12].

The FSS is a 9-item self-report questionnaire, which evaluates the effect of fatigue on activities. Each item is rated between 1 (no signs of fatigue) - 7 (disabling fatigue), and higher scores indicate increased fatigue severity. FSS is used in many studies and is recommended by the European Inflammatory Neuropathy Cause and Treatment group as it has shown good internal consistency, reliability and validity [9,13].

The FIM consists of 18 items that assess functionality under two major domains and six subscales. Major domains include physical/motor function (13 items) and cognitive function (5 items). Items are scored 1 (total assistance) - 7 (complete independence) [14].

Statistical analysis

All statistical analyses were performed using the program SPSS 21.0 (SPSS Inc., Chicago, Illinois, USA). All continuous variables were evaluated for normality using the Shapiro-Wilk test. Continuous variables were expressed as mean ± standard deviation, median (minimum and maximum values), and categorical variables as numbers and percentages. P-values were investigated as two-tailed, and p-values <0.05 were considered statistically significant.

Results

The demographic characteristics of the participants are shown as mean ± SD in Table 1. The average age was 55.90 ± 11.97 years in females and 63.14 ± 12.98 years in males. No statistical differences were found in the BMI scores of the groups (p>0.05).

Table 1. Baseline characteristics of participants by gender

	Female (n=11) Median (25%-75%)	Male (n=21) Median (25%-75%)	U	p*
Age (years)	60.00 (41.00-65.00)	64.00 (57.50-71.00)	82.50	0.190
BMI (kg/m^2)	27.34 (23.87-30.46)	26.50 (24.39-28.42)	54.50	0.400
Number of Medications	3.00 (1.25-5.75)	3.00 (1.00-6.50)	62.50	0.391
	n (%)	**n (%)**		**p****
Education Status				
Literate	7	11		0.001
Primary School	2	10		
High School	2	0		

BMI: Body Mass Index, 25%-75% interquartile range of the variables, *: Mann-Whitney U test. **: chi-square test

The clinical outcomes of both groups were presented in Table 2. The female group presented lower hip extensors muscle strength for both sides (right p=0.046, left p=0.025). The male group showed significantly worse fatigue scores (p=0.021). No statistical differences were detected in terms of other muscle strengths, pain level and functionality between groups (p>0.05; Table 2).

Table 2. Comparison of Pain, Proximal Strength, Fatigue and Functionality Results of Groups

	Female (n=11) Median (25%-75%)	Male (n=21) Median (25%-75%)	U	p*
Pain Severity (VAS-cm)	3 (0-8)	0 (0-7)	94.50	0.365
Hip Flexors Muscle Strength (Right)	3.5 (2.5-4)	4 (3-4)	47.50	0,097
Hip Flexors Muscle Strength (Left)	3 (2.5-4)	4 (3-4)	36.50	0.123
Hip Extensors Muscle Strength (Right)	3 (1.5-4)	4 (3-5)	31.0	0.036
Hip Extensors Muscle Strength (Left)	3 (1.5-4)	4 (3-5)	29.00	0.025
Hip Abductors Muscle Strength (Right)	3 (2.75-4)	4 (4-4)	34.50	0.131
Hip Abductors Muscle Strength (Left)	3.5 (2.75-4)	4 (3-4)	41.50	0.105
Hip Adductors Muscle Strength (Right)	3 (2.5-4)	4 (3-4)	35.00	0.095
Hip Adductors Muscle Strength (Left)	3 (3-4)	4 (3-4)	37.00	0.122
Hip Internal Rotators Muscle Strength (Right)	3 (2.5-4)	4 (3-5)	32.50	0.139
Hip Internal Rotators Muscle Strength (Left)	3 (3-4)	4 (3-5)	32.50	0.276
Hip External Rotators Muscle Strength (Right)	3.5 (2-4)	4 (3-5)	30.50	0.106
Hip External Rotators Muscle Strength (Left)	3 (2-4)	4 (3-5)	26.50	0.117
Fatique	3 (2.44-4.55)	5.55 (3.11-5.94)	57.50	0.021
Functionality	108 (88-122)	105 (96.50-119.50)	85.50	0.706

25%-75% interquartile range of the variables, *: Mann-Whitney U test

Discussion

The present study indicates that gender may have a potential effect on the disease symptoms in patients with GBS. According to our results, the strength of extensor hip muscles was lower in females with GBS, and the severity of fatigue was higher in males with GBS.

The results of the present study may provide beneficial information for constructing optimal rehabilitation programs. According to our results, hip muscle strength should be developed in both genders, and energy conservation techniques should be given more attention in male patients with GBS.

GBS incidence ranges from 0.62 to 2.66 cases/100,000 people across age groups, and the incidence increases by 20% per 10-year increase in age [15]. The incidence of GBS is higher in males than females. Hauck et al. reported a male to female incidence ratio of 1.5:1 [10,16]. Thus, GBS-related mortality rate is higher among males [17]. Similarly, male patients with GBS make up the majority in our study. All prevalence study results and the lack of the desired level of gender comparisons require symptomatic comparison between the genders for patients with GBS.

Motor and sensory problems dominate the clinical picture in patients with inflammatory neuropathies [9]. The multidisciplinary rehabilitation program is essential to restore functional deficits and sensory symptoms for GBS management [1]. Even though pain and functional loss have been previously reported in patients with GBS [18,19], the difference in pain severity and functionality was not compared according to gender. Current results indicate that pain reduction strategies are important for both groups. However, since females have lower pain thresholds and tolerances, even in healthy people [19], it should be taken into account that the severity of pain in female with GBS can increase under the influence of the disease. Similarly, the fact that females are more disadvantaged than males in terms of functional-related physical activity status [20] may also cause a faster decline in female's functional levels over time.

According to our results, although the severity of pain and functional disability were higher in females, no significant differences were determined between the groups. Thus, pain alleviating strategies should equally be considered in both groups. Improving muscle strength and endurance (especially hip extensors) in females with GBS and more emphasis on fatigue reduction strategies in male patients with GBS will help shorten the rehabilitation process.

There are several limitations to be discussed. The number of participants is limited. In addition, employing objective and detailed measures could provide more reliable results. In this term, dynamometers may be utilized to evaluate muscle strength. Retrospective design is also a limitation of our study. However, uncovering the effect of gender on symptoms is beneficial for establishing optimal treatment protocols in patient with GBS. Our study is the first study in this field and thus provides a basis for further studies. Future prospective studies with a larger number of participants are needed to confirm our results. In addition, future rehabilitation studies based on gender differences will reveal the true importance of our findings.

In conclusion, gender may influence disease symptoms in patients with GBS. Thus, it may be important to prioritize different symptoms for each gender.

Scientific Responsibility Statement
The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement
All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest
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